December 17, 2018

Town and Country Supply Association
P.O. Box 367
Laurel, MT 59044

Attention: Mr. Wes Burley

Subject: **Abbreviated Corrective Action Work Plan (AC-07) and Budget for the Petroleum Release at Town and Country Supply, Former Molt Bulk Plant**
1 Wolfskill Avenue, Highway 302, Molt, Stillwater County, Montana 59057
Facility ID 48-13552, Release 3634
Terracon Project No: 26017052

Dear Mr. Burley:

Terracon Consultants, Inc. (Terracon) prepared this *Abbreviated Corrective Action Work Plan* (CAP) presenting a scope of work to complete remedial injection and confirmation sampling for the Former Molt Bulk Plant (Town and Country Supply) facility located in Molt, Stillwater County, Montana. This document was prepared following the submittal of the Remedial Alternatives Analysis (RAA) dated September 15, 2017 and in response to the request letter from Montana Department of Environmental Quality (MDEQ) Petroleum Tank Cleanup Section project manager Marla Stremcha, P.E., dated August 10, 2018. The September 2017 RAA evaluated various remedial alternatives, including MNA, operation of an AS/SVE system, and *in-situ* remedial injection. Based on the evaluation, *in-situ* remedial injection was selected as the proposed remedial alternative for the site.

1.0 SCOPE OF WORK – REMEDIAL INJECTION SUMMARY

In accordance with the recommendations included in the *RAA* dated September 15, 2017, Terracon proposes completing *in situ* treatment, further discussed in the sections below, of the capillary fringe and groundwater bearing zone to reduce the petroleum concentrations in the groundwater.

Following completion of the *in situ* treatment and after a period of three to six months, Terracon will complete a groundwater sampling event to evaluate contaminant concentrations following the *in situ* remediation as presented herein.

The proposed remedial and sampling methodology of this remedial work plan is presented in the following sections.

1.1 *In Situ* Treatment

Prior to initiating the *in situ* remedial injection program, a utility clearance will be requested from Montana 811 at least 48 hours prior to commencing work. After utility clearances are obtained, the subsurface *in situ* remedial injection program will commence utilizing our subcontracted injection contractor. Due to potential underground piping and electrical lines associated with this facility, a vacuum truck may be utilized for potholing injection locations in the areas prior to remedial injection.

Proposed Treatment

The information obtained during the initial soil excavation activities and additional investigations completed on the site was utilized which remedial injection option would be best suited for the site. Based on the evaluation of the site-specific information, the proposed treatment has been designed to include the use of a combination of BOS-200® and gypsum. The focus of BOS-200® treatment program is designed to promote anaerobic oxidation of hydrocarbons through a sulfate-reduction mechanism. The following is a typical breakdown of BOS-200® blend:

Ingredient	Composition
Activated carbon	7.1%
Micro-nutrients	0.35%
Gypsum	1.8%
Water	91%
Bacteria*	6.4×10^7 Colony-Forming Units per gram of carbon

*Bacteria - Commercial products vary over a considerable range. Regardless of source, a sufficient amount of bacteria is added so that a targeted slurry concentration of 5 to 10 million colony-forming units per milliliter is attained.

The above materials are mixed with clean water for a short period of time to allow the bacteria to adsorb on to the carbon prior to injection. The “carbon microcosm” is then pre-inhabited by bacteria tailored for rapid assimilation and anaerobic oxidation of hydrocarbons.

The objective of the injection program is to create a three-dimensional network of material interlaced throughout the affected formation, such that it is unlikely that a significant volume of contaminants will move through the treatment zone without contacting activated carbon. Injection points are located fairly close to one another, and targeted injection depths are staggered. This provides some overlap to occur and create seams of material that are not separated by more than a few feet.

Once injected, BOS-200® rapidly reduces contaminant concentrations in soil and groundwater because hydrocarbon molecules are removed via adsorption by the activated carbon and are co-located with bacteria in the activated carbon pore network. As a result, hydrocarbon contaminant concentration within the carbon matrix is substantially higher than that which existed in the soil or groundwater prior to treatment. Rates of degradation within the carbon matrix are significantly faster than rates commonly observed using conventional in-situ bioremediation technology due to this concentration effect. As adsorbed contaminants are degraded, active sites within the carbon become available to adsorb fresh contaminant, and the cycle is repeated until the microcosm runs out of food, i.e. petroleum hydrocarbons. At the same time, gypsum present in the formulation provides a continuous source of sulfate to support the degradation process.

Terracon will contract with Alpine Remediation Inc. (Alpine) to perform the injection services. The proposed placement of the injection boreholes focuses on treating the area exhibiting benzene concentrations of 5,000 – 10,000 µg/L in groundwater with a 18,000-ft^2 treatment area. This area has been divided into two smaller areas based on the previous excavation. Area A will focus on the previously excavated portion and Area B on the rest of the treatment area. Area A is expected to be 10,000 square feet and Area B is approximately 8,000. Injection boreholes in both areas will be located using a 10-foot triangular grid. This will result in a total of 180 injection boreholes, 100 in Area A and 80 in Area B. Injection depths were determined by the available soil and groundwater data. Injection depths will be staggered in adjacent boreholes.

The treatment area is estimated to be approximately 18,000-ft^2 in aerial extent, as shown on Figure 1 attached to this work plan. A total of 31,500 pounds of BOS-200® and 22,750 pounds of gypsum will be installed into the treatment area. Injections will occur at 9, 11, 13, and 15 or 10, 12, and 14 feet bgs in both treatment areas and each injection depth will receive 50 pounds of BOS-200® and 25 pounds of supplemental sulfate. Bedrock is assumed to start at 15 feet bgs, but some injection boreholes may encounter refusal earlier. Injection depths will be staggered in adjacent boreholes. The proposed locations may be moved based on observations made in association with the current infrastructure and the treatment depth.

Based on information provided by our subcontractor, the design outlined above is based on achieving equilibrium groundwater benzene concentrations of 250 ug/L in Area A and 1,000 ug/L in Area B. Assuming the hydrocarbon load estimate is accurate, this design will install enough sulfate to mineralize all of the hydrocarbons in the treatment area within 1 to 2 years. However, based on the results of the confirmation groundwater sampling (further discussed in the sections below) to be completed following the completion of the initial remedial injection, a second installation of BOS-200® may be needed to further reduce the groundwater and vadose soil concentrations to below the desired clean-up levels.

Injection Technique

Alpine will use their standard diaphragm pump and injection wand that will be hand-pushed into the ground. The injection wand will have injection ports at the bottom end to deliver the injectate to the subsurface. The top of the injection wand will have high pressure valves with quick connect fittings. Alpine will have various extension rods to increase the depth capabilities of the wand. Since the wand will be pushed into the ground by hand, there may come a point where injections will need to be performed by direct-push in order to get to the desired depth.

A qualified Terracon scientist or engineer will observe all field activities and assist in directing the proposed injection program.

The proposed treatment area is shown on Figure 1 – Proposed Remedial Treatment Area, attached to this work plan. Final injection locations will be determined based on field conditions, or other considerations as may be expressed by Terracon or the client, but are ultimately a function of site access constraints, overhead or underground conflicts such as utilities or structures, or logistical considerations associated with the current use of the site.

1.2 Groundwater Monitoring Well Sampling

Once injected, BOS-200® rapidly reduces contaminant concentrations in soil and groundwater. Within the treated area, total dissolved solids, conductivity, sulfate, and nitrate may exceed background levels, at least initially. As the clean-up progresses, these parameters are expected to return to background levels.

As noted by our injection contractor, byproducts of the anaerobic degradation process include water, carbon dioxide, a variety of light alkane fermentation products such as methane, and sulfide from the reduction of available sulfate in the substrate. The catalyst formulation is designed to scavenge for sulfide, locking it up into insoluble, non-toxic precipitates. The principal precipitate is expected to be iron sulfide. Consequently, dissolved sulfide is expected to be maintained at a level orders of magnitude below the applicable groundwater standard. In addition, nitrate and sulfate concentrations in groundwater may also become elevated following the injection of BOS-200; however, they are expected to decrease as used by the microbes.

Prior to the injection program, the existing 16 groundwater monitoring wells will be sampled to establish a baseline of the compounds that may fluctuate as a result of the injection process. In addition, approximately two to three months following injection confirmation groundwater samples will be collected from the existing 16 groundwater monitoring wells to evaluate fluctuations in various compounds, including nitrate, sulfate, and iron, as well as the contaminants of concern. Non-dedicated, reusable equipment will be washed with Alconox® and triple-rinsed prior to monitoring or sampling any well.

Prior to well purging and sample collection, the static water level and free product level (if any) in the well will be measured from the north side of the top of the PVC casing with an oil-water interface probe.

Although free product is not anticipated, if free product is present, no sample will be collected from the well. Terracon will immediately notify the MDEQ of the presence of free product and discuss appropriate methods of removal and disposal of the free product. Once MDEQ has approved a removal and disposal protocol, the free product will be removed and disposed accordingly, in compliance with all applicable laws, regulations, and MDEQ requirements.

Prior to groundwater sample collection, each well will be purged with low-flow sampling equipment. Each monitoring well will be purged of a minimum of three well casing volumes of groundwater, until the monitoring well formation fails to recharge, (i.e., well runs dry) or consistent values (i.e., less than 10% variance between consecutive readings) are obtained for turbidity, dissolved oxygen, oxygen reduction potential, conductivity, pH, and temperature. Subsequent to sufficient recharge, one groundwater sample will be collected from each monitoring well utilizing low flow sampling equipment. Sampling procedures will be in general accordance with ASTM D 4448-01 (2007) *Standard Guide for Sampling Ground Water Monitoring Wells.*

Prior to use, portable field parameter measuring instruments will be calibrated using the following calibration solutions with the following metrics:

pH:	pH 4.0 and 7.0 buffer solutions
Conductivity:	1,413 uS conductivity solution
Dissolved Oxygen:	Sodium sulfite solution and oxygen saturated distilled water
Oxidation Reduction Potential:	1,413 uS conductivity solution
Turbidity:	1.0, 10.0 or 100.00 NTU solution (*depending upon site conditions*)

After purging, the groundwater samples will be collected and placed into appropriate laboratory prepared containers and preserved, labeled, and packaged on ice to maintain a temperature near 4° C. Preservation, packaging, and transporting procedures will be in general accordance with ASTM D4220-95 (Reapproved 2007) *Standard Practices for Preserving and Transporting Soil Samples* and laboratory directions. The samples will be hand-delivered or shipped under chain-of-custody procedures to a State of Montana accredited laboratory for analysis. Chain-of custody procedures will be in general accordance with ASTM D4840 – 99 (Reapproved 2010) *Standard Guide for Sample Chain-of-Custody Procedures*.

Groundwater samples collected will be submitted for the following suite of laboratory analytical testing:

- Volatile Petroleum Hydrocarbons by MDEP 98 VPH Method
- Extractable Petroleum Hydrocarbon Screen by MDEP 98 EPH Method*

  * All samples with EPH Screen concentrations exceeding 1,000 micrograms per liter (ug/L) will be submitted for Fractionated EPH by MDEP 98 EPH Method with polynuclear aromatic hydrocarbons (PAHs) by EPA Method 8270.
- Nitrate by EPA Method 300.0
- Sulfate by EPA Method 300.0
- Iron by EPA Method 6010

1.3 Investigation Derived Waste

Purged groundwater will be stored temporarily on-site in labeled 55-gallon drums pending the results of the laboratory analyses. The drum labels will identify the apparent contents of the drum and the initial accumulation date. The contents of the drums will be removed by a contractor licensed to transport and accept petroleum-impacted groundwater. All solid wastes will be transported per Administrative Rules of Montana (ARM) 17.50.523 which states:

> *(1) Solid waste must be transported in such a manner so as to prevent its discharge, dumping, spilling, or leaking from the transport vehicle.*

Development and purge water will be stored in drums on site and handled in accordance with the MDEQ Purge Water Flowchart.

Other Investigation Derived Waste (IDW) such as used personal protective equipment, disposable sampling equipment, and general refuse will be disposed of off-site, or as directed by the project manager and in accordance with applicable regulations.

1.4 Reporting

Following the completion of the initial remedial injection program and the follow-up confirmation groundwater sampling, a report will be prepared and submitted to the client and for MDEQ approval. The report will summarize the findings of the activities associated with the remedial injection program, and subsequent groundwater sampling event and will include the following:

- discussion of the release and previously conducted response actions;
- discussion of remedial and investigation methodology;
- discussion of data quality;
- discussion of the results of the remedial injection and confirmatory groundwater sampling event;
- discussion of the extent of petroleum-impacted groundwater, if any;
- conclusions;

- recommendations for further remedial actions, if appropriate;
- tables of analytical results;
- figures including site maps, sample location maps, potential receptor map, groundwater flow map, and plume map (if necessary);
- analytical results, laboratory data sheets, laboratory checklists, and chain-of-custody forms; and
- data validation reports.

2.0 BUDGET

Task	Estimated Cost
Cost to Prepare the Abbreviated Corrective Action Plan	$ 2,750.00
Project Management/Reporting	$ 3,095.00
Field Work- Remedial Injection	$ 14,901.25
Field Work - Groundwater sampling (16 wells; two events)	$ 14,105.50
Reporting (Includes baseline groundwater sampling event, one remedial injection and follow-up groundwater monitoring event)	$ 5,685.00
Subcontract Remedial Injection	$301,034.50
Analytical Fees*	$ 6,990.00
Total	**$348,561.25**

*Terracon understands that Town and Country Supply Association plans to pay Energy Laboratories, Inc. directly for all analytical fees. The estimated analytical costs include two groundwater sampling events for 16 monitoring wells. Should Town and Country Supply Association choose not to pay the laboratory directly, Terracon will charge a 10% markup on analytical fees.

3.0 GENERAL CONSIDERATIONS AND LIMITATIONS

Terracon's services will be performed in a manner consistent with generally-accepted practices of the professional undertaken in similar projects in the same geographic area during the same period. Terracon makes no warranties, expressed or implied, regarding its services, findings, conclusions or recommendations. Please note that Terracon does not warrant the work of laboratories, regulatory agencies, or other third parties supplying information used in the preparation of our findings and/or reports.

Findings, conclusions and recommendations resulting from these services will be based upon information derived from on-site activities and other services performed under this scope of services; such information is subject to change over time. Certain indicators of the presence of hazardous substances, petroleum products, or other constituents may have been latent, inaccessible, unobservable, nondetectable or not present during these services, and we cannot represent that the site contains no hazardous substances, toxic substances, petroleum products, or other latent conditions beyond those identified during this the completion of these services. Subsurface conditions may vary from those encountered at specific borings or wells or during other surveys, tests, assessments, investigations or exploratory services; the data, interpretations, findings and our recommendations are based solely upon data obtained at the time and within the scope of these services.

If you should have any questions or comments regarding this CAP, please contact the undersigned at (406) 656-3072.

Sincerely,
Terracon Consultants, Inc.

Robyn R. Sargent, CHMM
Office Manager

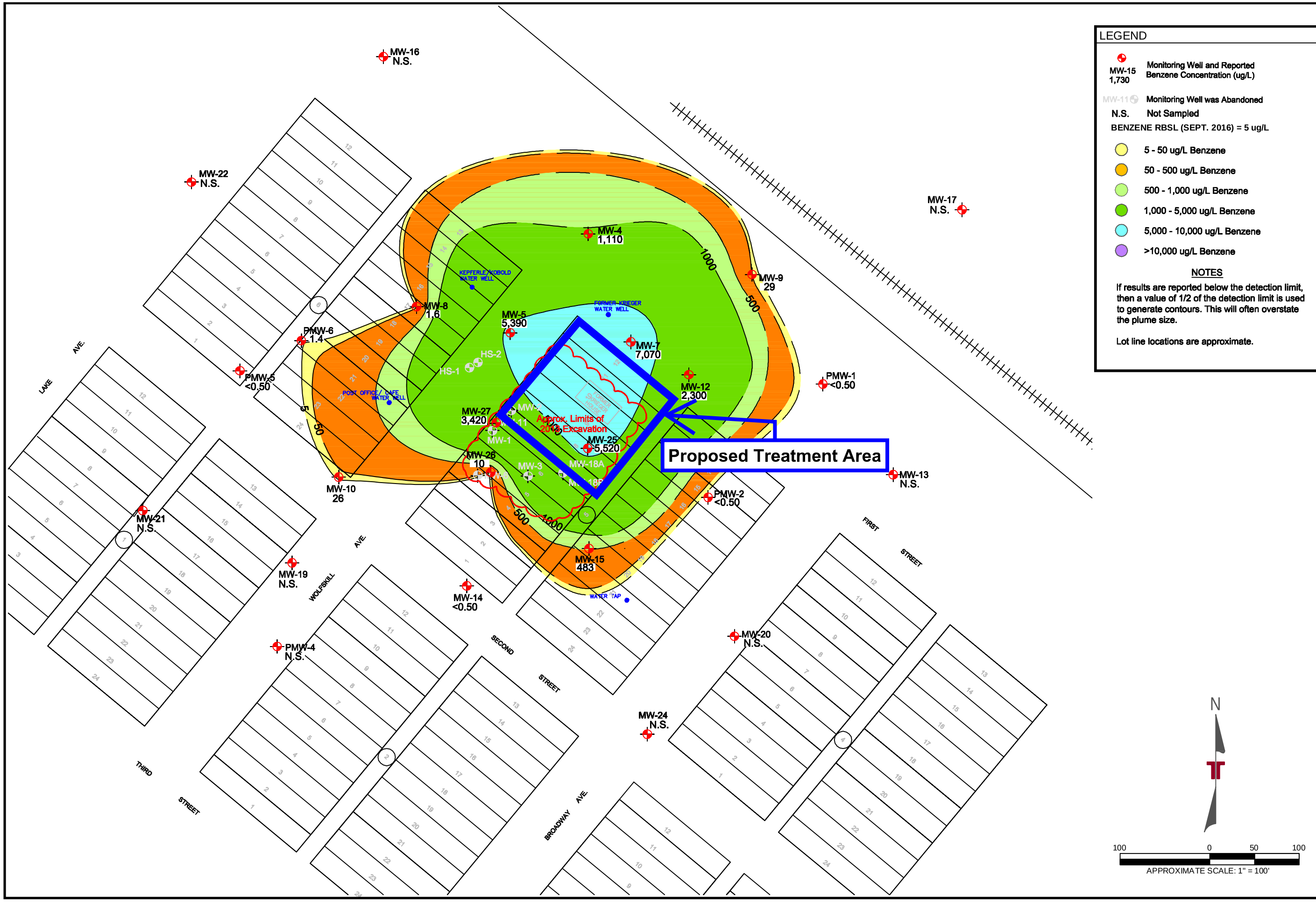
Derek Brown, P.E.
Senior Engineer

cc: Marla Stremcha, P.E., Montana Department of Environmental Quality

LIST OF FIGURES
Figure 1: Proposed Remedial Treatment Area

FIGURES

Figure 1 – Proposed Remedial Treatment Area



LEGEND

MW-15 1,730 — Monitoring Well and Reported Benzene Concentration (ug/L)

MW-11 — Monitoring Well was Abandoned

N.S. — Not Sampled

BENZENE RBSL (SEPT. 2016) = 5 ug/L

- 5 - 50 ug/L Benzene
- 50 - 500 ug/L Benzene
- 500 - 1,000 ug/L Benzene
- 1,000 - 5,000 ug/L Benzene
- 5,000 - 10,000 ug/L Benzene
- >10,000 ug/L Benzene

NOTES

If results are reported below the detection limit, then a value of 1/2 of the detection limit is used to generate contours. This will often overstate the plume size.

Lot line locations are approximate.

REV.	DATE	BY	DESCRIPTION

Proposed Remedial Treatment Area

FORMER MOLT BULK PLANT
DEQ FACILITY ID #48-13552
MOLT, MONTANA

Terracon
Consulting Engineers and Scientists
2110 OVERLAND AVENUE SUIT 124 BILLINGS, MT 59102
PH: (406) 656-3072 FAX: (406) 656-3578

Project Mngr:	RRS
Drawn By:	JLM (41)
Checked By:	RRS
Approved By:	RRS
Project No.	26017052
Scale:	AS SHOWN
File No.	MAY 2016 BENZ CF
Date:	12/2016

FIGURE

1

(FIG8 2016 BENZENE NOV)